

ATTACHMENT APPARATUS FOR A WORK SURFACE PANEL

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Background of the Invention:

Field of the Invention:

The invention lies in the mechanical arts and pertains, in particular to an attachment apparatus for a work surface
10 panel. The invention is based on an attachment apparatus for a work surface panel for a household appliance that has the form of a cabinet. The structure forming the work surface panel is intended to be in a defined position transversely with respect to the attachment direction and has a rearward surround for
15 the rearward attachment of the work surface panel by means of at least one holding pin on the body of the household appliance. The holding pin has a slotted-link section by way of which the holding pin passes through an elongated hole area in the surround and holds the surround at a defined height
20 position.

An attachment apparatus such as this is described in German utility model DE 74 11 413 U1 (Gebrauchsmuster). There, the rearward surround is screwed firmly (indirectly) to the body
25 of the household appliance at only one point in order to avoid the heat causing deformation of the work surface panel. All

the other connections are made by means of a holding pin, which passes through an elongated hole in the surround and holds the surround in a defined height position, but allows it sufficient freedom of movement in the lateral direction.

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However, that type of attachment leads to a problem when a another component of the device is connected at the same plane as the working surface, such as, for example, the control section in a washing machine that projects into the upper surface area. Gaps can be formed between the components that have been mentioned as a result of manufacturing tolerances in the housing, on the work surface panel and possibly on a further part on the top face of the housing, for example a control panel. In this case, it must be possible to align the position of the work surface panel with respect to the position of the housing or of this other part, which is not possible with the known attachment apparatus, because the work surface panel is screwed tight at one point, specifically such that it cannot be adjusted. However, since the two parts (for example the work surface panel and the control section) are not intended to be mounted offset with respect to one another in the lateral direction, which would have a severe adverse effect on the visual appearance, the attachment apparatus for the work surface panel must allow lateral adjustment.

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Summary of the Invention:

It is accordingly an object of the invention to provide an attachment apparatus for a working surface, which overcomes the above-mentioned disadvantages of the heretofore-known
5 devices and methods of this general type and in which tolerance compensation, which is suitable for mass production, can take place between the work surface panel and the housing, which is in the form of a cabinet, of a household appliance, or a further part which is mounted on the top face of the
10 housing.

With the foregoing and other objects in view there is provided, in accordance with the invention, a system with which a work surface panel can be attached to the cabinet-
15 shaped body of a household appliance. The work surface panel is to be attached to the body in a defined position transversely with respect to an attachment direction. An attachment apparatus for attaching the work surface panel comprises:

20 a rear surround integrally formed on the work surface panel and having at least one elongated hole formed therein;

at least one holding pin for attaching said rear surround to the body of the household appliance, said holding pin having a slotted-link section with a substantially rectangular cross

section configured to pass through said elongated hole in said rear surround; and

said at least one holding pin holding said rear surround at a defined height position, and exclusively holding said rear
5 surround to the body of the household appliance.

In other words, the objects of the invention are achieved in that according to the invention, this object is achieved in that the surround is held exclusively by way of holding pins,
10 whose slotted-link sections have a virtually rectangular cross section.

The work surface panel can now advantageously be adjusted with respect to all the other parts. The work surface panel can
15 thus be directed at a position which is aligned exactly with respect to the other housing parts, so that there is no offset to interfere with the aesthetic appearance. It is now possible to pass all leakage tests (water spray test, spillage test).

20 A further fault situation in which the work surface panel and possibly the control panel are each of maximum size for tolerance reasons and the housing is of minimum size can be avoided by the solution according to the invention. This fault situation would lead to the work surface panel being visibly
25 stressed with respect to the control panel, and this could

even lead to malfunctions in the control panel area. The attachment apparatus according to the invention can avoid this risk, in contrast to the prior art.

5 Furthermore, there is no longer any deformation as a result of stressing of the components, no unpleasant gaps formed between the control panel and the work surface panel; the individual components are not subject to stringent tolerance requirements, and a defined slight contact pressure can be
10 applied from the work surface panel to the control panel.

The rectangular shape of the slotted-link sections prevents the holding pin from being able to rotate in the elongated hole in the preinstalled position.

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The holding pin particularly advantageously has a head-like attachment above the slotted-like section. This attachment results in the holding pin being located in a defined manner on the outer surface of the surround, thus producing a
20 reproducible position.

Furthermore, the holding pin may advantageously have an axial hole through which the attachment element can pass. This allows the holding pin and the surround to be jointly fixed to
25 the housing.

This advantage can be extended even further by the holding pin having a shank as a continuation of the slotted-link section, which shank is slotted in the manner of a dowel and is intended to enter an opening on the body of the household appliance, where it can be attached by the attachment element by spreading. Specifically, during installation, the holding pin can then be inserted together with the slightly rotated attachment element (generally a screw) through the elongated hole in the surround into the attachment hole in the housing.

10 The dowel part of the holding pin is then spread in the attachment hole by rotation of the screw, and the holding pin is held securely in the attachment hole in a known manner. The work surface panel may for this purpose be held in a position such that it is adjusted with respect to the other housing

15 parts.

In accordance with a further embodiment of the invention, the slot advantageously extends into the head-like attachment and a key width of the slotted-link section has a smaller size

20 than the diameter of the adjacent shank. This allows the two shank parts to be pushed together in the circumference of the slot width during insertion of the holding pin into the elongated hole in the surround. In the final position, the holding pin is held loosely on the slotted-link section. Its

25 rectangular shape together with the internal contour of the elongated hole prevents the holding pin from being rotated.

If the head-like attachment has two ear-shaped projections at the side, whose internal separation is at least as large as the diameter of that part of the attachment element which is in the mounted position here, and the slots extend into the projections, a head of the attachment element will be located in a protected manner between the ear-shaped projections. Furthermore, the two ears guide the attachment element more reliably and into the axial hole during installation.

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In a further advantageous development of the invention, apertures are provided in the head-like attachment at the level of the slotted-link sections, and their unobstructed width is suitable for the insertion of a screw driver. In consequence, in order to disassemble the work surface panel after removal of the attachment elements, the two shank parts can be pushed towards one another by means of screw drivers or some other suitable tool until they are released from the wall of the attachment hole and make the shank narrower in order to make it possible to pull it back through the elongated hole in the surround.

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Other features which are considered as characteristic for the invention are set forth in the appended claims.

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Although the invention is illustrated and described herein as embodied in an attachment apparatus for a work surface panel, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may
5 be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention,
10 however, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

15 Brief Description of the Drawings:

Fig. 1 is a rear top perspective view of the work surface panel of a household appliance;

Fig. 2 is a detailed perspective view of a rear corner of the
20 work surface panel of Fig. 1;

Fig. 3 is a perspective view of a holding pin according to the invention; and

25 Fig. 4 is a sectional view of the holding pin of Fig. 3 with a detail of the housing rear face.

Description of the Preferred Embodiments:

Referring now to the figures of the drawing in detail and first, particularly, to Fig. 1 thereof, there is shown a top plate, or work surface panel 1 defining a work surface of a household appliance. The work surface panel 1 is combined on the top face of a body 3 of a household appliance, which is in the form of a cabinet, with a further part. The further part, in this case, is a control panel 2 that falls away slightly in the form of a curve towards the front face of the housing. On the front edge the work surface panel 1 is attached by its lower face to the top face of the housing body 3. On the rear face, the work surface panel 1 has a surround 4 (i.e., an angle piece, bent edge) with elongated holes 5, which are used for attachment of the work surface panel 1 in the direction of the front face of the body 3.

Fig. 2 shows an enlarged detail of a rear corner of the work surface panel 1. The elongated hole 5 is located in the vicinity of the lower edge of the surround 4 behind which the upper edge of the attachment hole 6 of the body 3 can be seen. A holding pin 7, as is shown in Fig. 3, is inserted into the attachment hole 6, passing through the elongated hole 5 in the direction of the arrow, and is secured by way of a screw 16 (Fig. 4). During the installation process, the position of the work surface panel 1 can then be adjusted laterally within the

extent of the degree of freedom provided by the elongated holes 5. This makes it possible to compensate for any dimensional tolerances that exist.

5 As is shown in Fig. 3, a holding pin 7 has an axial bore 17 and two shank parts 8 and 9, which are formed by an elongated slot 10 along the center axis of the holding pin 7. At the upper end, the holding pin 7 has a head-like attachment 11 with projections 12 which are similar to ears arranged at the
10 side. The slot continues into these projections 12 and thus provides the shank 8, 9 with enormous diameter elasticity, so that the shank parts 8, 9 can be deflected towards one another during insertion of the holding pin 7 into the elongated hole 5 and into the attachment hole 6.

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Directly underneath the head-like attachment 11, the holding pin 7 has a slotted-link area with flat surfaces 13, which give the holding pin 7 a virtually rectangular cross section at this point. The slotted-link surfaces 13 correspond to
20 surfaces 14 of apertures 15 in the head-like attachment 11, which are intended for the insertion of a tool, such as a screwdriver, by means of which the shank parts 8 and 9 can be pressed towards one another in the installed position, in order to release the holding pin 7 from the attachment hole 6
25 and from the elongated hole 5 in order to disassemble the work surface panel 1.

As is shown in Fig. 4, the holding pins 7 are locked by means of the integrally formed slotted-link surfaces 13 such that they cannot rotate once they have latched into the elongated hole 5, and are fixed by means of the undercut, which is provided by there being a shorter distance (key width) between the slotted-link surfaces 13 than the diameter of the shank 8, 9. In this case, the distance between the slotted-link surfaces 13 is approximately the same size as the unobstructed width of the elongated holes 5.

In the assembled state, the attachment elements pass through the length of the holding pins 7. In this case, screws 16 are provided as the attachment elements, which force the shank parts 8 and 9 apart from one another during insertion into the holding pin 7 and thus produce a close force fit (i.e., friction fit) between the outer surfaces of the shank parts 8 and 9 and the inner wall of the attachment holes 6. Since the holding pins 7 are preferably made of plastic, the edges of the attachment hole 6 also bury themselves in the shank parts 8 and 9 during the spreading process, thus also resulting in an interlock between these parts, which ensures a firm connection.

The spreading of the shank parts 8 and 9 of the holding pin 7 can be achieved by different screw types (for example screws

for plastics, self-tapping screws, etc) or by insertion pins
(which are not illustrated).

This application claims the priority, under 35 U.S.C. § 119,
5 of German patent application No. 103 13 600.2, filed March 26,
2003; the disclosure of the prior application is herewith
incorporated by reference in its entirety.